

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/20/2009 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 2, 5, 7-11, 13, and 16-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites a film portion having a "circumferential effective length based on a thickness of the metal film, which is a substantially integral multiple of a wavelength of the surface plasmon polariton wave." A surface plasmon polariton wave can have any number of wavelengths which can change depending upon a number of factors and as such it is unclear exactly how the metal film can have a specific unchanging circumferential effective length tied to the wavelength of a surface plasmon polariton wave which may change. As such the claim is rendered unclear.

The other claims are indefinite because they depend on an indefinite claim.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 2, 5, 7-11, 13, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Challener et al. (US 5,994,150) in view of Bozhevolnyi et al. (US 2002/0021445) and further evidenced by Lawrence et al. (US 6,642,881).

4. Regarding claim 1 Challener et al. discloses a sensor device for detecting a reaction of a sensor material with a specimen based on an intensity of a surface plasmon polariton wave generated by light irradiation and propagated along a surface of a sensor medium, the sensor device comprising; (See Col. 1 Lines 23-37) the sensor medium comprising a substrate, a metal film having a plurality of indentations formed on the substrate and the sensor material positioned on the metal film for reacting with the specimen, (See Fig. 3, Fig. 4, Col. 1 Lines 23-37 where there is a periodic thin film of metal, 310 or 410, with indentations surrounded by peaks, i.e. a periodic square profile and a sensor material on said film, 330 or 430)

Challenger does not specifically disclose the metal film having a plurality of openings formed on the substrate.

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Bozhevolnyi et al. discloses a sensing device (See [0182]) where a periodic structure comprises a plurality of openings provided in a metal film with a predetermined pitch for controlling the propagation of SPP waves. (See Abstract, [0129], and Fig. 2C where openings or holes 26 are provided in a metal film)

It would have been obvious to one of ordinary skill in the art at the time of invention to replace the plurality of indentations provided in a square profile periodic metal film with a predetermined pitch in the sensor of Challener with the plurality of openings provided in a metal film with a predetermined pitch of Bozhevolnyi et al. because a predetermined pitch pattern in a metal layer can be written as either openings or indentations (See Bozhevolnyi [0129] where holes are openings) and the openings represent a functional example of a surface profile as described by Challener. (See Col. 6 Lines 8-13)

Furthermore since the prior art of Bozhevolnyi et al. recognizes the equivalency of openings and indentations in a metal film in the field of devices using SPP waves, it would have been obvious to one of ordinary skill in the art at the time of the invention to replace the indentations of Challener with the openings of Bozhevolnyi et al. as it is merely the selection of functionally equivalent metal film structures recognized in the art and one of ordinary skill in the art would have a reasonable expectation of success in doing so.

Neither Challener or Bozhevolnyi specifically disclose the device wherein the openings have a size smaller than a wavelength of the irradiation light and a predetermined pitch that is substantially equal to an integral multiple of a wavelength of the surface plasmon polariton wave, and wherein the openings include adjacent two openings sandwiching a metal film portion having a length of circumference, which is a substantially integral multiple of a wavelength of the surface plasmon polariton wave.

It is noted that a recitation directed to the circumference and of the metal film and pitch of holes being a substantially integral multiple of a wavelength of a surface plasmon polariton wave is an intended use of the said device (i.e. dependent upon the wavelength of light used). In other words, the wavelength of a surface plasmon polariton wave formed by the device is dependent upon a wavelength of light used to irradiate said device and said circumferential length of said metal film and pitch of holes is fully capable of being a substantially integral multiple of a surface plasmon polariton wavelength if one provided the correct wavelength of light.

A recitation directed to the manner in which a claimed apparatus is intended to be used does not distinguish the claimed apparatus from the prior art, if the prior art has the capability to so perform. The recitation of a new intended use for an old product does not make a claim to that old product patentable. In re Schreiber, 44 USPQ2d 1429 (Fed. Cir. 1997).

It is also to be noted that and to support the examiners position above, Lawrence et al. discloses that the gratings (i.e. would clearly include any geometry) and pitch thereof on a substrate are dependent on the wavelength of the irradiated light (Column 4, lines 46-55). It is also to be noted that Bozhevolnyi teaches that geometries such as holes and troughs are functionally equivalent geometries for SPP waves.

In view of this explicit teaching, one skilled in the art would clearly recognize and appreciate that the holes according to modified Challaner (Challener in view of Bozhevolnyi et al.) would clearly depend on the wavelength of the light used and

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applicants claims do not specify the particulars of the openings or wavelength (i.e. numerical value for the opening size or particular wavelength used). In view of this , the claimed limitations are obvious to the skilled artisan absent clear evidence that the size of openings can not be a function of the wavelength used.

Furthermore, it is known in the art to alter the pitch and shape of the periodic structures of devices such as those described by Challenger depending upon application (See Lawrence Col. 4 Lines 46- 55 and Challenger Col. 6 Lines 4-15) and as such one of ordinary skill in the art would reasonably be able to alter said periodic structures through routine experimentation and arrive at a configuration with a pitch having a substantially equal to an integral multiple of the wavelength of a surface plasmon polariton wave. Burden is upon applicants to establish evidence that such an alteration is not within the scope of the skilled artisan.

Regarding claim 2 modified Challenger discloses all the claim limitations as set forth above as well as the sensor device wherein the sensor material is a biochemical sensor material. (See Challenger Col. 1 Lines 23-37)

Regarding claim 5 modified Challenger discloses all the claim limitations as set forth above as well as the sensor device wherein the openings have a slit shape, and their periodic arrangement is a one-dimensional arrangement in a surface of the metal. (See Challenger Col. 11 Lines 1-5 and Fig. 8 where grooves or slits, which contain openings as described above, have periodic arrangements which are one dimensional

and see Lawrence Fig. 1 where figure shows troughs or opening slits and peaks are formed in a metal film in a sinusoidal pattern which is arranged one dimensionally)

Regarding claim 7 modified Challenger discloses all the claim limitations as set forth above as well as the sensor device wherein the periodic structure is provided in a plurality of periodic structures, which have the same or different sizes and/or pitches of their openings and the same or different arrangement directions. (See Challenger Fig. 6, Fig. 8, Col. 9 Lines 28-52, and Col. 11 Lines 1-5)

Regarding claim 8 modified Challenger discloses all the claim limitations as set forth above as well as the sensor device wherein the periodic structure comprises-at least one recess portion or projection portion provided in the metal film . (See Challenger Fig. 4, Bozhevolnyi Fig. 2C, which contain recess and projection portions, and Lawrence Col. 1 Lines 28-36 where radiation is re-emitted or projected at edge or curve in metal film grating)

Regarding claim 9 modified Challenger discloses all the claim limitations as set forth above as well as the sensor device wherein the openings and the at least one recess portion or the projection portion have a substantially circular shape or a substantially polygonal shape, (See Challenger Fig. 4, Col. 6 Lines 5-13, and Bozhevolnyi Fig. 2C where openings are polygonal) and their periodic arrangements are

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two dimensional. (See Challenger Fig. 6 and Col. 9 Lines 37-52 and Bozhevolyni [0129] where scattering centers are arranged in a 2D pattern)

Regarding claim 10 modified Challenger discloses all the claim limitations as set forth above as well as the sensor device wherein the two-dimensional arrangement is such an arrangement that the recess portion or the projection portion is disposed concentrically around an opening. (See Challenger Col. 9 Lines 37-52 where grooves containing a projection portion and opening are formed concentrically)

Regarding claim 11 modified Challenger discloses all the claim limitations as set forth above as well as the sensor device wherein the openings and the at least one recess portion or the projection portion have a slit shape, and their periodic arrangements are one-dimensional (See Challenger Col. 11 Lines 1-5 and Fig. 8 where grooves or slits have periodic arrangements which are one dimensional and see Lawrence Fig. 1 where figure shows troughs or opening slits and peaks are formed in a metal film in a sinusoidal pattern)

Regarding claim 13 modified Challenger discloses all the claim limitations as set forth above as well as the sensor device wherein the metal film is a film of a metal or alloy selected from the group consisting of gold, silver, copper, and aluminum. (See Challenger Col. 6 Lines 14-17)

Regarding claim 16 modified Challenger discloses all the claim limitations as set forth above as well as the sensor device wherein the device comprises a prism. (See and Challenger Col. 1 Lines 37-40)

Modified Challenger does not specifically disclose the sensor device wherein the substrate comprises a prism.

Bozhevolyni discloses disclose a sensor device wherein the substrate comprises a prism. (See Bozhevolyni Fig. 1A , [0005])

It would have been obvious to one of ordinary skill in the art at the time of invention to use a substrate as a prism as described by Bozhevolyni in the device of modified Challenger because the prisms are known the be used as substrates in sensors utilizing SPP waves and represents a known way of exposing a light beam to said sensor through a prism as is known in the art and required by modified Challenger. (See Challenger Col. 1 Lines 37-40 and Bozhevolyni Fig. 1A , [0005])

Regarding claim 17 modified Challenger discloses all the claim limitations as set forth above as well as a sensor apparatus, comprising: a sensor device according to Claim 1 a light source for irradiating the chemical sensor with light (See Challenger 220 Fig. 2 and Col. 5 Lines 64-66) and a photodetector for detecting light transmitted through or reflected from the chemical sensor. (See Challenger 260 and 265 Fig. 2 and Col. 5 Lines 64-66)

Regarding claim 18 modified Challenger discloses all the claim limitations as set forth above as well as the sensor apparatus, wherein the photodetector comprises a spectroscope. (See Challenger Col. 11 Lines 14-21)

Claims 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Challenger et al. (US 5,994,150) in view of Bozhevolnyi et al. (2002/0021445) and further evidenced by Lawrence et al. (US 6,642,881) as applied to claims 1, 2, 5, 7-11, 13, and 16-18 above, and further in view of Corn et al. (US 2003/0100127).

Regarding claim 19 modified Challenger discloses all the claim limitations as set forth above but does not disclose the sensor wherein the photodetector comprises means for detecting light transmitted through a band-pass filter.

Corn et al. discloses a sensor wherein the photodetector comprises means for detecting light transmitted through a band-pass filter. (See Abstract and [0127])

It would have been obvious to one of ordinary skill in the art at the time of invention to use a detector with means for detecting light transmitted through a band-pass filter in the sensor of modified Challenger because the detector allows the sensor to optically measure the results of changes in the sensor material on the metal surface of a SPR sensor (See Corn Abstract and [0127]) as required by the sensor of modified Challenger. (See Challenger Col. 1 Lines 23-37)

Regarding claim 20 modified Challenger discloses all the claim limitations as set forth above as well as the sensor apparatus wherein the sensor medium is integrally supported in a micro total analysis system prepared through a semiconductor process. (See Corn [005], Bozhevolnyi [0123], and Challenger Col. 11 Lines 30-40 where device is used in sensor applications and can be used in micro total analysis systems such as protein and gene chips and can also be used to monitor multiple substances)

Regarding claim 21 modified Challenger discloses all the claim limitations as set forth above as well as the sensor apparatus wherein the sensor medium is integrally supported in a DNA chip prepared through a semiconductor process. (See Corn [005] and Bozhevolnyi [0123] where gene chip is a dna chip and device is used in sensor applications)

Regarding claim 22 modified Challenger discloses all the claim limitations as set forth above as well as the sensor apparatus, wherein the sensor medium is integrally supported in a protein chip prepared through a semiconductor process. (See Corn [005] and Bozhevolnyi [0123] where device is used in sensor applications)

Regarding limitations recited in claims 1-22 which are directed to a manner of operating disclosed device, it is noted that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and

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2115. Further, it has been held that process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

Response to Arguments

5. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

The circumference of the metal film and pitch of holes being a substantially integral multiple of a wavelength of a surface plasmon polariton wave is an intended use of the said device. The wavelength of a surface plasmon polariton wave formed by the device is dependent upon a wavelength of light used to irradiate said device and said circumferential length of said metal film and pitch of holes is fully capable of being a substantially integral multiple of a surface plasmon polariton wavelength if one provided the correct wavelength of light. It has been held that a recitation directed to the manner in which a claimed apparatus is intended to be used does not distinguish the claimed apparatus from the prior art, if the prior art has the capability to so perform. The recitation of a new intended use for an old product does not make a claim to that old product patentable. In re Schreiber, 44 USPQ2d 1429 (Fed. Cir. 1997).

It is also to be noted that and to support the examiners position above, Lawrence et al. discloses that the openings (troughs) and pitch of the openings on a substrate are dependent on the wavelength of the irradiated light (Column 4, lines 46-55).

In view of this explicit teaching, one skilled in the art would clearly recognize and appreciate that the holes according to modified Challaner (Challener in view of Bozhevolnyi et al.) would clearly depend on the wavelength of the light used and applicants claims do not specify the particulars of the openings or wavelength (i.e. numerical value for the opening size or particular wavelength used). In view of this , the claimed limitations are obvious to the skilled artisan absent clear evidence that the size of openings can not be a function of the wavelength used..

Furthermore, it is known in the art to alter the pitch and shape of the periodic structures of devices such as those described by Challener depending upon application (See Lawrence Col. 4 Lines 46- 55 and Challener Col. 6 Lines 4-15) and as such one of ordinary skill in the art would reasonably be able to alter said periodic structures through routine experimentation and arrive at a configuration with a pitch having a substantially equal to an integral multiple of the wavelength of a surface plasmon polariton wave. Burden is upon applicants to establish evidence that such an alteration is not within the scope of the skilled artisan.

Applicants provide no clear evidence why such a relationship between opening size and wavelength is not within the scope of the skilled artisan.

Applicants argue that Challener does not disclose the openings. Thus is acknowledged, however clearly obvious to the skilled artisan in view of the statements made above.

Applicants argue that Lawrence does not disclose a metal film with openings, per se, however, applicants are not addressing the examiners reasons for combining, that being that the gratings (i.e. would clearly include any geometry) and pitch thereof on a substrate are dependent on the wavelength of the irradiated light (Column 4, lines 46-55). In view of this, the claimed limitations are obvious to the skilled artisan absent clear evidence that the size of openings can not be a function of the wavelength used. It is also to be noted that Bozhevolnyi teaches that geometries such as holes and troughs are functionally equivalent geometries for SPP waves.

Applicants argue that Bozhevolnyi does not cure the deficiencies of the other references. It is to be noted that applicants are not addressing the examiners reasons for combining.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN M. HURST whose telephone number is (571)270-7065. The examiner can normally be reached on Mon. - Thurs. 6:30-5:00; Every Fri. off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Marcheschi can be reached on (571)272-1374. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. M. H./

Examiner, Art Unit 1797

/Michael A Marcheschi/

Supervisory Patent Examiner, Art Unit 1797